

Translation of WO 2004/111346 (PCT/EP2004/006195)
with Amended Pages Incorporated Therein

SPECIFICATION

Title: Flood Protection Wall

The invention relates to a flood protection wall.

Unfortunately, natural catastrophes, such as floods, occur today with increased frequency. Primarily in cities with rivers flowing through the cities, protection walls are built up in order to protect endangered buildings from the flood. The construction of the known protection walls is usually very time-consuming and expensive, wherein frequently the safety of the protection walls against the high water is less than optimal.

It is the object of the invention to provide a flood protection wall which can be built up and also removed very quickly and simply, wherein also the stability of the actual protection wall is significantly increased.

In accordance with the invention, this object is met by the characterizing features of claim 1.

Useful further developments of the invention are characterized in the dependent claims.

The flood protection wall of the invention is initially distinguished by its relatively simple and quick assembly and disassembly. The wall elements of the flood protection wall which preferably bulge out toward the high water level ensure a particularly high stability of the flood protection wall against the water pressure because of their specific shape.

Further advantages of the invention result from the following description with the aid of an embodiment which represents the invention and is schematically illustrated in the drawing. In the drawing:

Fig. 1 is a front view of the flood protection wall according to the invention,

Fig. 2 is a top view of the flood protection wall,

Fig. 3 is a longitudinal sectional view of a fully mounted support post,

Fig. 4 is an individual illustration of the coupling piece interacting with the support post and the ground anchor prior to tightening the clamping pieces,

Fig. 5 is a perspective view of the clamping piece on the

side of the screw,

Fig. 6 is a perspective view of an embodiment of the clamping piece on the side of the nut,

Fig. 7 is a perspective view of the coupling piece,

Fig. 8 is a longitudinal sectional view of the coupling,

Fig. 9 schematically shows the ground anchor,

Fig. 10 is a longitudinal sectional view of the ground anchor,

Fig. 11 is a sectional view along sectional line XI-XI in Fig. 10,

Fig. 12 is a sectional view along line XII-XII in Fig. 11,

Fig. 13 is a perspective view of the support post,

Fig. 14 is longitudinal sectional view of the support post,

Fig. 15 is a side view of a corresponding cover,

Fig. 16 is a detail XVI of Fig. 3 after tightening of the clamping pieces, and

Fig. 17 is a sectional view along line XVII-XVII in Fig. 16.

The flood protection wall 1 illustrated in the Figures is composed essentially of the following individual parts: ground anchors 2 to be embedded in concrete, coupling pieces 3, support posts 4, clamping legs 5 and 6, screws 7 and nuts (not illustrated), wherein the nuts are mounted each in one of the clamping pieces, for example, 5 in the illustrated embodiment.

The ground anchors 2, which are individually illustrated in Figs. 9 to 12, are advantageously anchored in concrete (not shown) along the shore of a river in the vicinity of a city or the like with predetermined spacing. When a flood is expected, the coupling piece 3 is inserted into longitudinal grooves 8 (see Figs. 11 and 12), the coupling piece 3 is inserted into the ground anchor 2 and is coupled through a rotation of 90 degrees in the manner of a bayonet. As a result, cams 9 of the coupling piece 3 engage in a corresponding inner circumferential groove 10 of the ground anchor 2.

Subsequently, the support post 4 is placed on the coupling piece 3 in such a way that conical transverse bores 11 of the support post 4 (see Figs. 13 and 14) are in alignment with a transverse bore 12 of the coupling piece 3, wherein the transverse bore 12 has at both ends a conical widened portion 13 each.

The two conically-shaped clamping pieces 5 and 6 are then placed from both sides of the support post 4 in the conical transverse bores 11 of the support post in such a way that the clamping pieces 5 and 6 are engaging already a portion of the conical expanded portions 13 of the transverse bore 12 of the coupling piece 3.

The configuration of an embodiment of the clamping pieces 5, 6 is illustrated in Figs. 5 and 6. The clamping piece 5 on the side of the screw has a through-bore 14 for the screw 7, while, in the illustrated embodiment, the clamping piece 6 on the side of the nut has a somewhat conical internal hexagon 15 for frictionally clamping the nut (not illustrated) which belongs to the screw 7. The nut is received in the internal hexagon 15 of the clamping piece 6 at such a depth that a hexagon wrench of the conventional type (not shown) can still be inserted over the nut into the internal hexagon 15, in order to provide a counter force when the screw 7, which has a polygonal head, for example, a triangular or square head, is tightened with an appropriate special wrench (not illustrated).

In an embodiment of the clamping piece 5, 6 which is not illustrated, the clamping piece 6 on the side of the nut merely has a coaxially turned recess into which the nut is placed.

The clamping piece 6 on the side of the nut may also have a thread in the concentric through bore, so that the clamping piece 6 simultaneously serves as a nut and the additional nut is not required (not illustrated).

When the screw 7 is tightened, the clamping pieces 5, 6, which, as seen in Fig. 4, are seated initially with play in the respective conical transverse bore 11 of the support post 4 and in the conical expanded portions 13 of the transverse bore 12 of the coupling piece 3, are pulled inwardly so that by a type of wedge effect the coupling piece 3 is pulled upwardly and simultaneously to press the support post 4 downwardly onto the ground anchor 2. This procedure is limited by the contact of the cams 9 of the coupling piece 3 at the upper wall 16 of the inner circumferential groove 10 of the ground anchor 2 and is made understandable by the illustration of Fig. 4. In Figs. 16 and 17, which show a detail XVI of Fig. 3, the clamping pieces 5, 6 are tightened by the screw 7 and the nut (not illustrated in this Figure).

A wall element 17, preferably a wall element 17 which bulges out toward the high water level, for example, is arched (see Fig. 2). For this purpose, the support posts 4 have oppositely directed longitudinally extending grooves 18 in which the lateral edges 19 of the wall element 17 are held. On the side of the grooves 18 located on the side facing away from the high water level, a longitudinally extending sealing member (not shown) is provided.

In order to possibly even further increase the height of the flood protection wall 1, an extension support post 20 can be placed on the support posts 4 and releasably connected therewith (see Fig. 1). The connection mechanics between the support posts 4 and the extension support posts 20 is the same as the above-described connection mechanics between the ground anchor 2 and the support post 4. An additional wall element 21, preferably an additional wall element which bulges toward the high water level, for example, an arch-shaped wall element 21, can be used always between two extension support posts 20. The extension support posts 20 also have the oppositely directed longitudinally extending grooves 18 in which the lateral edges 22 of the wall elements 21 are held. The extension support posts 20 also have the oppositely directed, longitudinally extending grooves 18 in which the lateral edges 22 of the wall elements 21 are held. On the side of the grooves 18 facing away from the high water level, a longitudinally extending seal (not illustrated) is also provided.

The flood protection wall 1 can additionally be provided with a cover 23 which is illustrated in a side view in Fig. 15 and which, instead of the coupling piece 3 and the support post 4 or the extension support post 20, is locked bayonet-like in the ground anchor 2 or in the support post 4 when the flood

protection wall 1 is not needed and, after loosening the screw 7, the support posts 4 together with the coupling piece 3 is after a return rotation of 90 degrees taken out of the ground anchor 2 or is intended as an upper end part on the respective support post 4 or extension support post 20. The cover 23 also has cams 24 for the bayonet closure which, in contrast to the cams 9 of the coupling piece 3, have hardly any axial play in the inner circumferential groove 10 of the ground anchor 2.

It should also be mentioned that, for draining the water or for seepage of rain water, the ground anchor 2 is hollow and has an axial bore 25 toward the coupling piece 3.

CLAIMS:

1. Flood protection wall, with ground anchors (2) to be embedded in concrete flush with the ground surface, and with support posts (4) releasably connectable to the ground anchors, with a coupling piece (3) each between the support posts 4 and the ground anchors (2), wherein the respective coupling piece (3) is connectable to the ground anchor (2) by a bayonet-type connection, and wherein the coupling piece (3) has a transverse bore (12) which is conically widened at both ends thereof, and wherein in these conically widened portions (13) which continue in oppositely located conical transverse bores (11) of the support post (4), a clamping piece (5 or 6) each is received, wherein these clamping pieces (5, 6) tighten in a frictionally engaging manner the support posts (4) in the ground anchor (2) within the bayonet-type closure by means of a screw (7) which is actuatable by means of an appropriate special wrench and clamp the support post (4) against the ground anchor (2), and characterized in that between always two support posts (4) a wall element (17), which is bulging out toward the high water level, can be inserted.

2. Flood protection wall according to claim 1, characterized by extension support posts (20) which are releasably connectable to the support posts (4), with a coupling piece (3) each between the support post (4) and the extension support post (20), wherein each coupling piece (3) can be connected to the support post (4) by a bayonet-type connection, and wherein the coupling piece (3) includes a transverse bore (12) which is conically expanded at both ends thereof and wherein in these conical expanded portions (13), which continue in oppositely located conical transverse bores (11) of the extension support post (20), a clamping piece (5 or 6) each is received, wherein these clamping pieces (5, 6) tighten in a frictionally engaging manner the extension support post (20) in the support post (4) within the bayonet-type closure (9), (10) by means of a screw (7) which can be actuated by means of an appropriate special key, and clamp the extension support post (20) relative to the post (4), and wherein always between two extensions posts (40) an additional wall element (21), also a wall element (21) which bulges toward the high water level, can be inserted.

3. The flood protection wall according to claims 1 or 2, characterized in that the clamping pieces (5, 6) are seated with appropriate play in the conically widened portions (13) of the transverse bore (12) of the coupling pieces (3) and in the conical transverse bores (11) of the support posts (4) or the extension support posts (20), such that, when the screw (7) is tightened, the clamping pieces (5, 6) exert a wedge action for moving the coupling piece (3) upwardly and for moving the support post (4) or the extension support post (20) downwardly.
4. Flood protection wall according to one of claims 1 to 3, characterized by a cover (23) for covering the ground anchor (2) when the support post (4) has been removed or for covering the support post (4) when the extension support post (20) has been removed.
5. Flood protection wall according to claim 4, characterized in that the cover (23) can be coupled to the ground anchor (2) or the support post (4) by a bayonet-type connection.

6. Flood protection wall according to one of claims 1 to 3, characterized in that the support posts (4) or the extension support post (20) have oppositely directed, longitudinally extending grooves (18) in which the lateral edges (19, 22) of the wall elements (17, 21) are held.
7. Flood protection wall according to claim 6, characterized in that a longitudinally extending seal is provided on the side of the grooves (18) facing away from the high water side.